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New records of corticioid fungi in Turkey

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ABSTRACT — A recent survey of wood-inhabiting *Basidiomycota* in Turkey has added 10 corticioids to the Turkish mycobiota; included are first records of the genera *Boidinia* and *Leptosporomyces* in the country. All collected species are described and their distribution in Turkey is summarized. Microscopical line-drawings and ecological notes are provided.

KEY WORDS — *Corticiaceae* sensu lato, *Abies cilicica*

Introduction

Intensive fungal diversity research has been carried out in *Abies cilicica* forests throughout the Mediterranean part of Turkey. There are two subspecies of *Abies cilicica* in Turkey — *A. cilicica* subsp. *cilicica* (Antoine & Kotschy) Carrière, which grows in the East Taurus Mountains, and *A. cilicica* subsp. *isaurica* (Coode & Cullen) Carrière, endemic to the West Taurus Mountains. Fir forest occurs at an elevation of 1400–1800 m on stony and chalky soil. The fir forests in the Taurus Mountains are both pure stands or mixed with *Cedrus libani* A. Rich., *Juniperus excelsa* M. Bieb., *J. foetidissima* Willd., and *Pinus nigra* subsp. *caramanica* (Loudon) Businský. The studied areas are affected by Euro-Mediterranean climate. Because there are no more data about corticioids growing in *Abies cilicica* forests in Turkey (Doğan et al. 2005; Doğan & Karadelev 2009; Solak et al. 2007; Sesli & Denchev 2008), these finds will provide better knowledge on the distribution of some rare corticioids in Turkey.

Materials & methods

The material was collected from seven localities (FIG. 1) in the spring and autumn of 2008 through 2009 on logs, stumps, rotten wood, fallen branches, etc., of *Abies cilicica*. The collections were examined with Melzer's reagent and 5% KOH. Identifications were made by referring to Bernicchia & Gorjón (2010), Breitenbach & Kränzlin

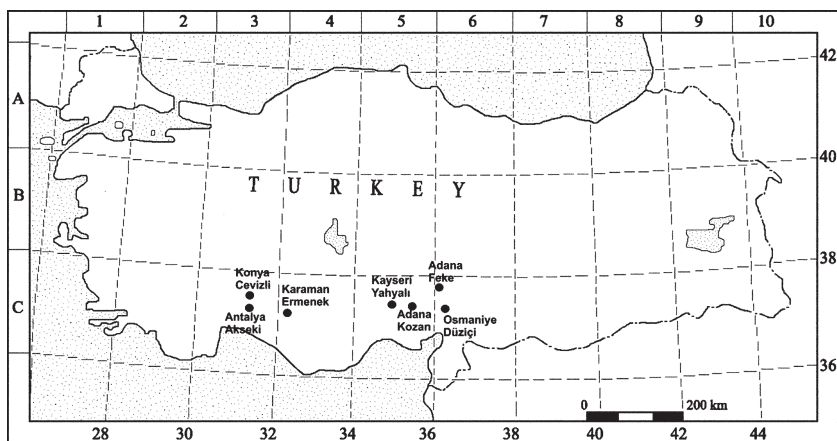


FIG. 1. Distribution of the species in Turkey.

(1986), Eriksson & Ryvarden (1973–76), Eriksson et al. (1978), Hjortstam et al. (1987), Jülich (1984), and Langer (1994). All identified materials are stored at the Mushroom Application and Research Centre of Selcuk University in Konya, Turkey.

Taxonomy

Aleurodiscus amorphus (Pers.) J. Schröt., Die Pilze Schesiens 1: 429, 1888. FIG. 2

SPECIMEN EXAMINED: TURKEY. ADANA: Kozan, Kuyunun Gedik district, in *Abies cilicica* subsp. *cilicica* forest, on bark of *Abies*, 37°46'58N-035°35'30E, 1341 m, 30 Apr 2008, leg. H.H. Doğan, Coll. No: HHD3406.

FRUITING BODY disc to cup shaped, 0.5–1 mm thick, 1–7 cm across. HYMENOPHORE pinkish to orange-red. HYPHAL SYSTEM monomitic, simple septated, hyphae 2–4 µm wide. CYSTIDIA distinctly moniliform, tube like 120–160 × 6–10 µm. BASIDIA 140–175 × 20–25 µm. BASIDIOSPORES subglobose to oval, echinulate, 25–30 × 20–22 µm.

The discomycete-like appearance and the large, echinulate spores make this species easy to recognize. *Aleurodiscus amorphus* has a circumboreal distribution, and the most common host genus is *Abies*. In the Alps and in Northern Europe the host is often *Picea abies* (Kotiranta & Saarenoksa 2000), and in North America it also grows on several *Picea* species (Martin & Gilbertson 1977). In Turkey the species was collected on bark of living *Abies*.

Boidinia furfuracea (Bres.) Stalpers & Hjortstam, Mycotaxon 14: 77, 1982. FIG. 3

SPECIMEN EXAMINED: TURKEY. KARAMAN: Ermenek, Damlaçalı, in *Abies cilicica* subsp. *isaurica* forest, on rotten branch of *Abies*, 37°42'02N-032°59'34E, 1752 m, 24 May 2008, leg. H.H. Doğan, Coll. No: HHD3531 and 3549.

FRUITING BODY fully resupinate, very tiny and attached to the substrate, floccose and several centimetres in extent. HYMENOPHORE surface porous, easily wiped off and white to greyish. HYPHAL SYSTEM monomitic, with clamps, 1.5–3.5 μm wide. GLOECYSTIDIA tubular and sinuous, 60–80 $\times$ 5–8 μm . BASIDIA cylindrical clavate, 25–35 $\times$ 4–6 μm . BASIDIOSPORES subglobose to globose, echinulate, amyloid, 4–6 μm .

Easily recognized microscopically, the species is characterized by globose, verrucose, strongly amyloid spores, sulfopositive gloecystidia, and clamped septa. This uncommon but widely distributed European species grows on the trunks of *Pinus pinea* and *Abies alba* (Bernicchia & Gorjón 2010) in Italy. In Scandinavia it is known from *Pinus sylvestris* and *Picea abies* (Eriksson & Ryvarden 1973), and in Great Britain and Ireland it grows on decayed wood and fallen bark of conifers such as *Larix*, *Picea*, and *Pinus* spp., and (rarely) on decayed *Pteridium* debris (Legon & Henrici 2005). In Turkey the species was collected on a rotten *Abies* branch.

Botryobasidium vagum (Berk. & M. A. Curtis) D.P. Rogers, Univ. Iowa Stud. nat. Hist. 17(1): 17, 1935.

FIG. 4

SPECIMEN EXAMINED: TURKEY. OSMANIYE: Düziçi, Kuşçu village, Çağsak district, in mixed *Abies cilicica* subsp. *cilicica*, *Fagus orientalis* and *Pinus nigra* forest, on wood debris of *Abies*, 37°21'38N–036°30'00E, 1524 m, 14 Apr 2009, leg. H.H. Doğan, Coll. No: HHD4543, 4544 and 4546.

FRUITING BODY resupinate, thin, floccose and several centimetres in extent. HYMENOPHORE reticulate to hypochnoid and greyish white to yellowish. HYPHAL SYSTEM monomitic, without clamps, up to 8–10 μm wide. CYSTIDIA none. BASIDIA clavate to subcylindrical, 18–25 $\times$ 8–12 μm , normally with 6 sterigmata. BASIDIOSPORES navicular shaped, thin walled, 8–12 $\times$ 4–6 μm .

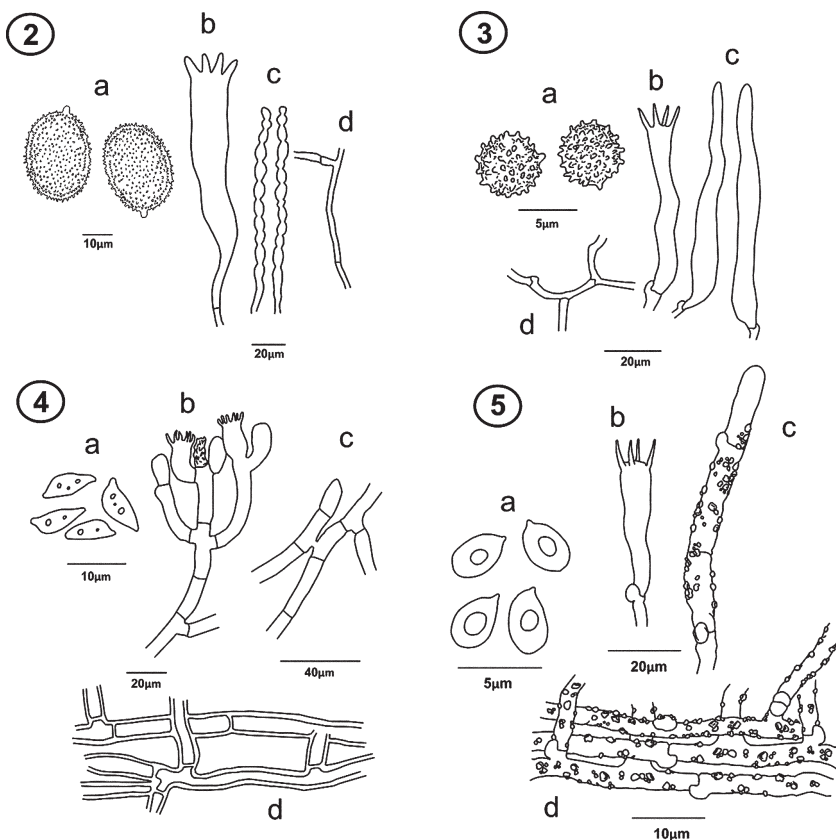
This cottony-tomentose shaped species is very similar to *B. candicans* J. Erikss., from which it is separated by larger basidiospores and broader basidia. *Botryobasidium vagum* grows on different dead conifer wood lying on the ground (Breitenbach & Kränzlin 1986, as *B. botryosum*). Bernicchia & Gorjón (2010) in Italy cited the following substrates for this species: *Pinus nigra*, *Picea abies*, *Quercus pubescens* and *Fagus sylvatica*. In Turkey the species was collected on *Abies* wood debris.

Ceraceomyces eludens K.H. Larss., Folia cryptog. Estonica 33: 74, 1998.

FIG. 5

SPECIMEN EXAMINED: TURKEY. ANTALYA: Akseki, Uzunyazı, in *Abies cilicica* subsp. *isaurica* forest, on rotten wood of *Abies*, 37°06'20K–031°50'42E, 1444 m, 18 Apr 2008, leg. H.H. Doğan, Coll. No: HHD3301.

FRUITING BODY resupinate, effused, 0.1–0.3 mm thick. HYMENOPHORE more or less meruloid, cracked when dry, margin whitish, finely fibrillose, white yellowish to cream-white, to pale yellowish ochraceous. HYPHAL SYSTEM



FIGS. 2–5. 2: *Aleurodiscus amorphus*; a. basidiospores, b. basidium, c. moniliform cystidia, d. hyphae. 3: *Boidinia furfuracea*; a. basidiospores, b. basidium, c. gloeocystidia, d. hyphae. 4: *Botryobasidium vagum*; a. basidiospores, b. basidium, c. subhymenial hyphae, d. basal hyphae. 5: *Ceraceomyces eludens*; a. basidiospores, b. basidium, c. cystidia, d. hyphae.

monomitic, with clamps, 2–3 µm wide, with sparse crystalline encrustation. CYSTIDIA numerous, hyphoid with an obtuse apex and clamped septa, with pyramidal crystals, 60–100 × 4–5 µm. BASIDIA clavate to subcylindrical, 20–25 × 4–5 µm. BASIDIOSPORES ellipsoid to subglobose, smooth, thin walled, 3–5 × 3–4 µm.

This meruloid species has small, drop-shaped spores and long septocystidia. This fungus could be confused with *Trechispora cohaerens* (Schwein.) Jülich & Stalpers, which has almost the same spores, but has distinctly shorter basidia and no cystidia (Breitenbach & Kränzlin 1986). In Italy *C. eludens* is known only from coniferous wood of *Picea abies*, *Pinus pinea*, and *Taxus baccata* (Bernicchia & Gorjón 2010). According to Krieglstainer (2000), it also grows

on broadleaved trees, such as *Fagus* and *Quercus*. In Turkey the species was collected on rotten *Abies* wood.

Crustoderma corneum (Bourdot & Galzin) Nakasone, Mycologia 76: 45, 1984.

FIG. 6

SPECIMEN EXAMINED: TURKEY. ADANA: Kozan, Kuyunun Gedik district, in *Abies cilicica* subsp. *cilicica* forest, on bark of *Abies*, 37°46'58N-035°35'30E, 1341 m, 30 Apr 2008, leg. H.H. Doğan, Coll. No: HHD3406.

FRUITING BODY resupinate, attached tightly to the substrate, 0.1–1 mm thick and several centimetres in extent. HYMENOPHORE more or less tuberculate irregularly verrucose, cream-white to gray-ocher when dry crustose. HYPHAL SYSTEM monomitic, with clamps, 5–8 µm wide. LEPTOCYSTIDIA thick walled, inflated base and blunt tip, 80–130 × 3–7 µm. BASIDIA slenderly clavate, 30–55 × 3–7 µm. BASIDIOSPORES cylindric-elliptic, smooth, thin walled, 10–12 (15) × 3–5 µm.

This resupinate fungus, which attaches tightly to the substrate, is cream-colored and irregularly shaped. *Phlebia longicystidia* (Litsch.) Hjortstam & Ryvarden is similar, but it has smaller spores and produces chlamydospores. The main characteristics of *C. corneum* are the corneous consistence of the basidiome, the thick-walled hyphae, and the large basidiospores. It is a very rare species growing on conifer wood, especially on *Pinus* (Kriegelsteiner 2000). According to Bernicchia & Gorjón (2010) *C. corneum* in Europe is known from Bosnia and Herzegovina, Croatia, Belgium, Sweden, Norway, Finland, and Spain. In Turkey the species was collected on *Abies* bark.

Hyphodontia floccosa (Bourdot & Galzin) J. Erikss., Symbolae Botanicae Upsalienses 16(1): 104.

FIG. 7

SPECIMEN EXAMINED: TURKEY. KAYSERİ: Yahyalı, Burhaniye, in *Abies cilicica* subsp. *isaurica* and *Juniperus excelsa* forest, on decayed wood of *Abies*, 37°50'48K-035°34'41E, 1475 m, 16 Apr 2009, leg. H.H. Doğan, Coll. No: HHD4595.

FRUITING BODY resupinate, effused, thin and several centimetres in extent. HYMENOPHORE floccose to odontoid, cream to ochraceous. HYPHAL SYSTEM monomitic, with clamps, 3–4 µm wide. CYSTIDIA tubular with obtuse apical part, 80–100 × 3–5 µm. BASIDIA clavate to cylindrical 15–20 × 3–5 µm. BASIDIOSPORES allantoid, smooth, thin walled, 7–11 × 2–3 µm.

This odontoid *Hyphodontia* has small, close, conical aculei, smooth, thin-walled, allantoidal spores, and numerous tubular thick-walled in basal part cystidia. It is very close to *H. subalutacea* (P. Karst.) J. Erikss., from which it is distinguished by its odontoid hymenophore with cystidia developed in the apices of the aculei. It is a rare but widespread species known from many European countries, where it grows on *Larix decidua*, *Picea abies*, and *Pinus nigra* (Bernicchia & Gorjón 2010). It is also found in North America (Eriksson

& Ryvarden 1973). In Turkey this species was collected on decayed wood of *Abies*.

Leptosporomyces mutabilis (Bres.) Krieglst., Z. Mykol. 57: 53, 1991.

FIG. 8

SPECIMENS EXAMINED: TURKEY. OSMANİYE: Düziçi, Kuşçu village, Çağsak district, in *Abies cilicica* subsp. *cilicica*, *Fagus orientalis* and *Pinus nigra* forest, on fallen wood remnants of *Abies*, 37°21'38N-036°30'00E, 1524 m, 14 Apr 2009, leg. H.H. Doğan, Coll. No: HHD4551; ANTALYA: Akseki, along Konya road, in *Abies cilicica* subsp. *isaurica*, *Cedrus libani*, *Juniperus excelsa* and *J. foetidissima* forest, on rotten wood of *Abies*, 37°05'29N-031°46'06E, 1298 m, 2 May 2009, leg. H.H. Doğan, Coll. No: HHD4620.

FRUITING BODY fully resupinate, attached loosely to the substrate, thin and several centimetres in extent. HYMENOPHORE athelioid, membranous-tomentose, white when young, later cream-colored. HYPHAL SYSTEM monomitic, with clamps, 3–4 µm wide, with incrustated crystals. CYSTIDIA none. BASIDIA clavate 10–20 × 3–4 µm. BASIDIOSPORES elliptical, smooth, 4–5 × 2–2.5 µm.

The genus *Leptosporomyces* is very closely related to *Athelia* but has a more densely interwoven hymenium as well as more slender, less clavate basidia, and smaller spores. Moreover, the species described here is characterized by the presence of small rhizomorphs. The very similar *L. septentrionalis* differs in having somewhat narrower spores and it normally lacks rhizomorphs. It grows on very rotten wood of conifers, such as trunks of *Picea abies* and *Abies alba* (Bernicchia & Gorjón 2010) and, according to Krieglsteiner (2000), also on *Larix decidua*, *Pinus sylvestris*, *Pseudotsuga menziesii*, *Betula pendula*, *Fagus sylvatica*, and on plant debris on the ground. In Turkey, *L. mutabilis* was collected on rotten *Abies* wood.

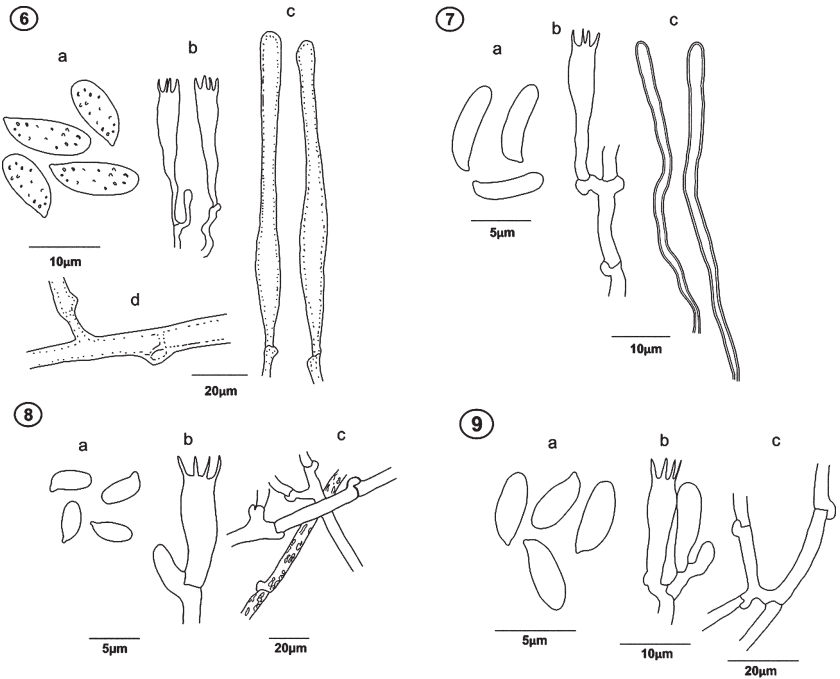
Leptosporomyces septentrionalis (J. Erikss.) Krieglst., Z. Mykol. 57: 53, 1991.

FIG. 9

SPECIMEN EXAMINED: TURKEY. ADANA: Feke, Yatiroluk elma district, in *Abies cilicica* subsp. *cilicica* forest, on decayed wood of *Abies*, 37°49'05N-036°04'12E, 1630 m, 2 May 2008, leg. H.H. Doğan, Coll. No: HHD3462.

FRUITING BODY resupinate, easily detachable from the substrate, thin and several centimetres in extent. HYMENOPHORE athelioid, smooth to slightly merulioid, white when young, later ocher-yellowish. Hyphal System monomitic, with clamps, 4–6 µm wide, not incrustated crystals. CYSTIDIA none. BASIDIA clavate 10–15 × 3–4 µm. BASIDIOSPORES elliptical, smooth, 5–6 × 2–3 µm.

The species is characterized by the presence of small rhizomorphs and a fruit body with a rose tint. The very similar *L. mutabilis* differs in having somewhat broader spores, and it normally lacks rhizomorphs. This is a rare species growing on much decayed wood, mostly on conifers but sometimes also on deciduous substrates. Its distribution is apparently mainly boreal continental (Eriksson & Ryvarden 1973). According to Legon & Henrici (2005), the species grows on



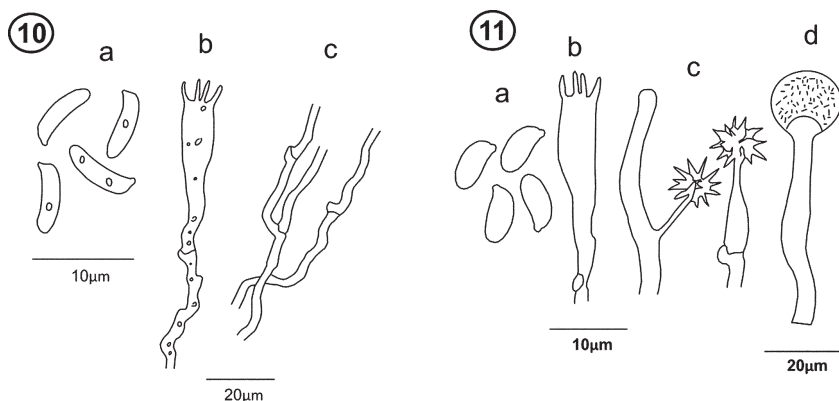
FIGS. 6–9. 6: *Crustoderma corneum*; a. basidiospores, b. basidium, c. leptocystidia, d. hyphae. 7: *Hyphodontia floccosa*; a. basidiospores, b. basidium, c. leptocystidia. 8: *Leptosporomyces mutabilis*; a. basidiospores, b. basidium, c. hyphae. 9: *Leptosporomyces septentrionalis*; a. basidiospores, b. basidium, c. hyphae.

decayed wood and bark of *Pinus sylvestris* in Great Britain and Ireland. From Italy, Bernicchia & Gorjón (2010) cite *Picea abies*, *Abies alba*, and a woody fence as substrates. In Turkey, this species was collected on decayed *Abies* wood.

Phlebia subcretacea (Litsch.) M.P. Christ., Dansk bot. Ark. 19(2): 165, 1960. FIG.10

SPECIMEN EXAMINED: TURKEY. KONYA: Cevizli, Çukur, Kuyucak, in *Abies cilicica* subsp. *isaurica*, on rotten wood of *Abies*, 37°18'32N-031°34'02E, 1605 m, 19 Apr 2008, leg. H.H. Doğan, Coll. No: HHD3313.

FRUITING BODY resupinate, effused, adnate, very thin and several centimetres in extent. HYMENOPHORE ceraceous-subgelatinous when fresh, crustaceous-corneous when dried, white or yellowish when young, later ocher-yellowish. HYPHAL SYSTEM monomitic, with clamps, 2–3 µm wide. CYSTIDIA none. BASIDIA clavate 30–35 × 4–5 µm. BASIDIOSPORES allantoid, smooth, 5–7 × 1.5–2.5 µm.



FIGS. 10–12. 10: *Phlebia subcretacea*; a. basidiospores, b. basidium, c. hyphae. 11: *Resinicium bicolor*; a. basidiospores, b. basidium, c. cystidiole, d. halocystidia.

A fairly uniform and easily determined species, *P. subcretacea* possesses characteristic allantoid, smooth, thin-walled spores. Uncommon but widely distributed in Europe (Bernicchia & Gorjón 2010), the species grows on decayed, mostly decorticate wood from both conifers and broadleaved trees. In Italy it always occurs in mountainous conifer forest of *Picea abies* and *Abies alba*, and on branches of *Juniperus communis* (Bernicchia & Gorjón 2010). *P. subcretacea* is less frequent or rare, and scattered species throughout northern Europe (Eriksson & Ryvarden 1973). In Turkey this species was collected on rotten *Abies* wood.

***Resinicium bicolor* (Alb. & Schwein.) Parmasto, Consp. System.**

Corticac.: 98, 1968.

FIG. 11

SPECIMEN EXAMINED: TURKEY. OSMANİYE: Düziçi, Kuşçu village, Çağsak district, in *Abies cilicica* subsp. *cilicica*, *Fagus orientalis* and *Pinus nigra* forest, on decayed wood of *Abies*, 37°21'38N-036°30'00E, 1524 m, 14 Apr 2009, leg. H.H. Doğan, Coll. No: HHD4540 and 4541.

FRUITING BODY resupinate, closely adnate, widely effused, ceraceous. HYMENOPHORE, odontoid, with small conical teeth, whitish or cream-coloured. HYPHAL SYSTEM monomitic, with clamps, 2–3 µm wide. CYSTIDIA of two kinds: 1) halocystidia numerous, cylindrical with a capitate apex, 20–35 × 5–10 µm, halo 10–15 µm wide; 2) astrocystidia numerous, arising laterally or terminally from subulate hyphae, apically encrusted with a star-like cap of crystals. BASIDIA clavate to subcylindrical, 15–25 × 4–6 µm. BASIDIOSPORES elliptical to cylindrical, smooth, 5–7 × 2.5–3.5 µm.

Resinicium bicolor is microscopically easily diagnosed by its typical cystidia (astrocystidia). It is widespread, very frequent on coniferous wood (although

not rare on deciduous wood), and plays an important role as a wood decomposer in humid forests. The species causes an intense white decay. It is a common and widespread species in Europe growing on decayed wood of conifers such as *Abies*, *Larix*, *Picea*, *Pseudotsuga* and *Pinus* spp., rarely on deciduous trees such as *Fagus*, *Betula*, *Carpinus*, *Fraxinus*, *Salix*, *Sambucus*, etc. (Krieglsteiner 2000; Legon & Henrici 2005; Bernicchia & Gorjón 2010). In Turkey the species was collected on decayed *Abies* wood.

Remarks

Some species (e.g., *Aleurodiscus amorphus*, *Botryobasidium vagum*, *Leptosporomyces septentrionalis*, *Resinicium bicolor*) grow only on *Abies cilicica* subsp. *cilicica* while others (e.g., *Boidinia furfuracea*, *Phlebia subcretacea*, *Ceraceomyces eludens*, *Crustoderma corneum*, *Hyphodontia floccosa*) were collected only on *Abies cilicica* subsp. *isaurica*. *Leptosporomyces mutabilis* is a common species growing on both *Abies* subspecies. Two genera, *Boidinia* and *Leptosporomyces*, are new for Turkish mycobiota.

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